Video
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Plankton Revealed

A critical component of life on Earth

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Plankton are an essential component of life on Earth. Marine plankton, found in all ocean ecosystems, play a critical role in maintaining the health and balance of the ocean and its complex food webs. The oxygen, nutrients, and biomass they produce also sustain terrestrial life—from the food we eat to the air we breathe.

Plankton—derived from the Greek root *planktos*, meaning “wanderer” or “drifter”—are unable to swim against currents, tides, or waves. The word refers to the numerous organisms floating throughout aquatic ecosystems.

Phytoplankton are the tiny, plant-like producers of the plankton community. They include bacteria and algae that form the base of aquatic food webs. Common phytoplankton include diatoms, dinoflagellates, cyanobacteria (blue-green algae), and green algae. Through photosynthesis, phytoplankton use sunlight, nutrients, carbon dioxide, and water to produce oxygen and nutrients for other organisms. With 71% of the Earth covered by the ocean, phytoplankton are responsible for producing up to 50% of the oxygen we breathe. These microscopic organisms also cycle most of the Earth’s carbon dioxide between the ocean and atmosphere.

Zooplankton are the animal-like primary consumers of plankton communities. In turn, zooplankton then become food for larger, secondary consumers such as fish. Zooplankton include microscopic and macroscopic organisms. Some zooplankto—such as copepods, krill, and arrow worms—will drift the ocean as plankton for their entire lives. Other zooplankton live only a portion of their lives as ocean drifters. These include oysters, crabs, and some fish.

Plankton also play a role at the end of the food web—as decomposers and detritivores. These plankton, including bacteria, fungi, and worms, break down and consume dead plant and animal material that falls through the water column as "marine snow." Marine snow often includes fecal matter, sand, soot, skin, and other organic and inorganic particles descending to the seafloor.

Through plankton sampling, scientists like Richard Lampitt can monitor this important component of life on Earth.

QUESTIONS

- What are some different ways to classify plankton?

  Plankton can be classified in numerous ways, including
- **size**
- **shape**
- **distribution**

- **producers** or **consumers**
- **phytoplankton** or **zooplankton**
- whether the organisms are **temporary** or **permanent** plantonic creatures

- Why do Dr. Lampitt and his team find more phytoplankton at the top of the water column (near the ocean surface)?

Phytoplankton rely on sunlight (as well as temperature and nutrients) for photosynthesis. Sunlight only permeates the upper layers of the ocean, called the epipelagic or euphotic zone. **Below this zone, few phytoplankton have the necessary sunlight for photosynthesis.**

- How are people dependent on ocean plankton for their survival and health?

1) Ocean phytoplankton provide **up to 50% of the oxygen we breathe**.
2) Ocean plankton are the base of the ocean food web. These food webs provide **food and financial resources** to billions of people around the world.
3) Phytoplankton uptake carbon dioxide. This makes them an important part in the **regulation of climate change**.

FAST FACTS

- Marine snow got its name because it looks like snowflakes sinking down to the bottom of the ocean. Some marine "snowflakes" can grow to be more than 5 centimeters (1.9 inches) in diameter and can take weeks to reach the seafloor.

- Plankton provide the most ancient evidence of life on Earth. *Stromatolites* are thin layers of fossilized cyanobacteria (a type of plankton) that date from between 2.8 billion to 3.5 billion years ago.

- Foraminifera (forams) and radiolarians are microscopic zooplankton. The tests, or shells, of these plankton are so abundant that they form the majority of seafloor sediment in many parts of the ocean. The chemicals found in foram tests are also be used by oceanographers to study what the Earth's climate was like in the past.

VOCABULARY

Term	Part of Speech	Definition
algae	*plural noun*	(singular: alga) diverse group of aquatic organisms, the largest of which are seaweeds.
aquatic	*adjective*	having to do with water.
arrow worm	*noun*	predatory marine worms that drift in the deep sea as plankton.
atmosphere	*noun*	layers of gases surrounding a planet or other celestial body.
bacteria	*plural noun*	(singular: bacterium) single-celled organisms found in every ecosystem on Earth.
biomass	*noun*	living organisms, and the energy contained within them.
copepod	*noun*	microscopic marine organism (crustacean).
current	*noun*	steady, predictable flow of fluid within a larger body of that fluid.
cyanobacteria	*noun*	type of aquatic bacteria that can photosynthesize light to create energy. Also called blue-green algae (even though it is not algae) and (in freshwater habitats) pond scum.
decomposer	*noun*	organism that breaks down dead organic material.

detritivore	*noun*	organism that consumes dead plant material.
diatom	*noun*	type of algae, most of which are only one cell.
dinoflagellate	*noun*	one-celled marine organism that is a major component of plankton.
ecosystem	*noun*	community and interactions of living and nonliving things in an area.
fecal	*adjective*	having to do with excrement.
food web	*noun*	all related food chains in an ecosystem. Also called a food cycle.
fungi	*plural noun*	(singular: fungus) organisms that survive by decomposing and absorbing nutrients in organic material such as soil or dead organisms.
inorganic	*adjective*	composed of material that is not living, and never was, such as rock.
krill	*noun*	small marine crustacean, similar to shrimp.
marine	*adjective*	having to do with the ocean.
marine snow	*noun*	continuous fall of organic and inorganic particles (including the remains of marine organisms, fecal matter, shells, and sand) from the upper layers of the water column to the seafloor.
microscopic	*adjective*	very small.
nutrient	*noun*	substance an organism needs for energy, growth, and life.
organic	*adjective*	composed of living or once-living material.
photosynthesis	*noun*	process by which plants turn water, sunlight, and carbon dioxide into water, oxygen, and simple sugars.
phytoplankton	*noun*	microscopic organism that lives in the ocean and can produce its own food through photosynthesis.
plankton	*plural noun*	(singular: plankton) microscopic aquatic organisms.
primary consumer	*noun*	organism that eats plants or other autotrophs.
producer	*noun*	organism on the food chain that can produce its own energy and nutrients. Also called an autotroph.
sampling	*noun*	a small part of a group observed and tested to represent the whole group.
secondary consumer	*noun*	organism that eats meat.
soot	*noun*	sticky black particles produced as some fuels, such as coal and wood, are burned. Also called black carbon.
terrestrial	*adjective*	having to do with the Earth or dry land.
tide	*noun*	rise and fall of the ocean's waters, caused by the gravitational pull of the moon and sun.
water column	*noun*	area reaching from the sediment of a body of water to its surface.
wave	*noun*	moving swell on the surface of water.
zooplankton	*noun, plural noun*	microscopic organism that lives in the ocean.

For Further Exploration

Audio & Video

- NASA Earth Observatory: What are Phytoplankton?

Instructional Content

- National Geographic: Marine Food Chains and Biodiversity

Video

- National Geographic Channel: Light the Ocean—Plankton Krill Power
- National Geographic Channel: Plankton Light Show

Websites

- National Geographic Channel: Alien Deep
- NOAA: Bridge—Plankton
- NOAA: National Estuarine Research Reserve System—Estuary Education: Planet Plankton
- University of Hawaii Center for Microbial Oceanography: Research and Education C-MORE Science Kits—Plankton

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